FINAL REMEDY DECISION

TRW, Incorporated
SULLIVAN, MISSOURI
EPA ID# MOD094390416

INTRODUCTION

This final remedy decision has been prepared by the Missouri Department of Natural Resources (the department) and Region VII of the U.S. Environmental Protection Agency (EPA). This decision summarizes the final remedy for the subject facility and presents a Response to Comments (RTC) document which addresses numerous comments that were received during the public comment period for the proposed final remedy contained in the Statement of Basis. The proposed remedy contained in the Statement of Basis has not been altered in response to public comments and is hereby selected as the final remedy.

EPA has been advised by the department that a draft State Corrective Action Abatement Order on Consent (Draft Order) will be transmitted to TRW shortly after issuance of this final remedy decision to establish the administrative framework for both final remedy implementation and long-term remedy operation, maintenance and monitoring.

BASIS OF SELECTED FINAL REMEDY

Based upon the data collected during the RCRA Facility Investigation (RFI) and associated health-based risk assessment studies, groundwater was concluded to be the primary exposure pathway for facility-related contaminants. TRW's historical on-site soil excavation activities that were directed at contaminant source areas had adequately removed surficial soils and sediment that were above the Soil Action Levels (SALs) at the facility. The deep soil boring installed and sampled during the RFI did not indicate the presence of any of the contaminants of concern above the SALs. TRW evaluated dye trace studies performed by the department in Winsel Creek to evaluate the interaction of surface water and groundwater immediately adjacent to the facility. The results of the dye study did not indicate a connection to City of Sullivan municipal wells, although dye was detected in Meramec Caverns. EPA sampled Meramec caverns in March of 1995 and did not detect TCE above any health based limits in both groundwater and in-cavern air samples. Surface water and sediment sampling conducted along Winsel Creek also did not indicate the presence of the primary contaminants of concern above applicable soil or groundwater regulatory guidance criteria.

The RFI did confirm the presence of facility-related contaminants in groundwater above applicable groundwater regulatory guidance criteria and assessed the horizontal and vertical extent of the groundwater contamination caused by releases from the former TRW facility. To date, TRW has installed a total of 41 monitoring wells of shallow (150 feet), intermediate (350 feet), and deep (550 feet) depth on and surrounding the facility property, and has conducted geophysical logging of the subsurface in selected monitoring wells. The RFI activities also determined that the primary contaminants of concern (TCE, 1,2-DCE, 1,2-DCA, lead and chromium) were present above applicable groundwater regulatory guidance criteria at various

depths within the aquifer that serves as the water supply for the City of Sullivan. The City of Sullivan and TRW both sample and monitor water supply quality in the City of Sullivan to assure that the water supply meets Missouri Safe Drinking Water Law and Regulations. The city and TRW provide quarterly monitoring reports to federal and state officials. The proposed groundwater protection standards (GPS) clean up levels that are to be set forth in the state-issued consent order are shown in Table 1. The lead and chromium concentrations shown on Table 1 are total metals concentrations based on unfiltered groundwater samples. Groundwater contamination has affected the shallow, intermediate and deep zones of the aquifer underlying the facility. TCE has been found in groundwater above its proposed GPS level in the shallow, intermediate and deep zones. Chromium, lead, 1,2-DCE, and 1,2-DCA have all been found in the groundwater greater than the proposed GPS levels in the shallow zone. Detailed discussion of the extent of groundwater contamination in all zones may be found in the RFI report, which is part of the Administrative Record.

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During the corrective action process, four Interim Measures Plans were implemented: the Groundwater Monitoring Plan (GMP), the Surface Impoundments Soils Report (SISR), the Drinking Water Contingency Plan (DWCP) and the Pump and Treatment Plan (P&TP).

The GMP details the parameters and frequency for sampling of groundwater monitoring wells installed by TRW, private wells within a two mile radius and all City of Sullivan Municipal Wells. This plan was approved by the agencies on August 30, 1993. A revised plan was later approved by the agencies, which was dated January 1998.

The DWCP details procedures to be followed by TRW in the event that elevated groundwater contamination, due to releases from the facility, is detected in excess of the action levels. The DWCP also presents several alternatives to be undertaken by TRW to provide potable water in place of any impacted well(s). This plan was approved by the agencies on December 17, 1993.

The SISR evaluated all existing soil data taken at the location of the former surface impoundments and was utilized to develop the standards for long-term care, security and maintenance of the cover soils currently in place there. This plan was approved by the agencies on December 26, 1997.

The P&TP details an on-site, shallow groundwater recovery and treatment system currently in-place and operating at the TRW facility. This interim measures plan was put in place to reduce the highest contaminant concentrations in groundwater directly underlying the site in the shallow zone of the aquifer. This plan was approved by the agencies on May 15, 1994, and began operation in October 1995.

As discussed previously, the primary contaminants of concern found in the groundwater underlying the former TRW facility are lead, chromium and certain volatile organic compounds (VOCs) including 1,2-DCE and 1,2-DCA and most notably TCE. The following remedy is to address contaminated groundwater at the former TRW facility:

A. Continuation of the standards set forth in the GMP and DWCP that were previously developed under the federally issued consent order. As part of the proposed remedy, these plans will be revised and resubmitted to the agencies under the terms and conditions of a state issued order.

   1. The conditions contained in the Revised GMP shall specify that TRW's groundwater monitoring systems be designed, installed, operated and all maintained in a manner that ensures: 1) detection and/or delineation of the horizontal and vertical extent of groundwater contamination (including beyond the facility property boundary); 2) determination of representative concentrations of hazardous constituents and/or contaminant plume indicator parameters in the groundwater; and 3) TRW's ability to determine the effectiveness of the groundwater corrective action program in terms of contaminant removal, destruction and/or containment. When new information becomes available, such as upon the installation of new monitoring wells or increasing contaminant concentrations at groundwater monitoring points, a modification may be made to the GMP by the department or proposed by TRW.

   2. The conditions contained in the Revised DWCP shall set forth procedures to be followed by TRW in response to obtaining sampling data, collected in accordance with the Revised GMP, which indicate that groundwater contamination is in excess of GPS or other health based standards under the Federal Safe Drinking Water Act and Missouri Drinking Water Standards for potable municipal and private groundwater supply wells and is attributable to releases from the facility.

B. A Corrective Measures Implementation (CMI) Work Plan shall address the foregoing requirements and shall include applicable CMI elements as specified in Chapter V of the EPA document titled, RCRA Corrective Action Plan (Final), May 1994, OSWER Directive 9902.3-2A, necessary for the effective and efficient implementation of the final remedy.

1. The following corrective action work shall be addressed in the CMI Work Plan:

    a. TRW shall install a shallow zone monitoring well to replace monitoring well OBG-20S, which is a perimeter monitoring well which has gone dry. This replacement shallow zone well shall be installed to a deeper depth to avoid going dry in the future. The purpose of this monitoring well is to provide the northerly extent of TCE contamination in the shallow zone of the aquifer.

    b. TRW shall propose an exact location for, and upon departmental approval, shall install an intermediate depth monitoring well in the area immediately north of Municipal Well No. 2.

    c. TRW shall propose an exact location for, and upon departmental approval, shall install an intermediate depth monitoring well in the area south-southwest of OBG-21D.

2. TRW shall detail the design, location and installation schedule for an on-site, intermediate-depth recovery well to be incorporated into the ongoing shallow groundwater recovery and treatment system. The CMI Work Plan shall detail, at a minimum, the following issues:

    a. A detailed discussion on the proposed location of the intermediate depth recovery well and the targeted yield volume of such a well. The goal of the groundwater corrective action program is to provide localized control of the contaminant plume in the shallow and intermediate zones without interfering with the continued viability of Municipal Well No. 2 as a water supply well. If the groundwater yield from any installed shallow or intermediate depth monitoring well is below the anticipated yield and proves inadequate in providing localized plume control, additional shallow and intermediate depth recovery wells may be required by the department.

    b. An evaluation of air-emissions from the on-site groundwater treatment system including construction and permitting approval, as applicable, from the department's Air Pollution Control Program;

    c. A detailed discussion of any upgrading of the current groundwater treatment system installed on site, including all engineering plans and calculations;

    d. A detailed discussion of the anticipated disposition of the effluent from the groundwater recovery system. If this effluent is to be discharged to the

City of Sullivan's POTW, the CMI Work Plan shall specify that a chemical analysis of the treated effluent will occur. This analysis shall contain metals data in addition to VOCs; and

e. Certification by a registered, independent professional engineer and a registered geologist, both in the state of Missouri, shall be required for this plan.

TABLE 1 – Groundwater Protection Standards for the TRW Facility

Chemical Constituent	Maximum Contaminant Limit (µg/l)	Regulatory Basis
INORGANICS		
Barium	2000	a, b
Chromium	100	a, b
Lead	15	a, b
ORGANICS		
1,2-Dichloroethane	5	a, b
1,1-Dichloroethylene	7	a, b
Cis-1,2-Dichloroethylene	70	a, b
Trans-1,2-Dichloroethylene	100	a, b
Trichloroethylene	5	a, b
Vinyl Chloride	2	a, b

3. TRW shall place groundwater use restrictions in the property chain-of-title prohibiting the installation of wells for domestic or industrial use. The CMI Work Plan shall outline the specific institutional controls that will be placed in the property chain-of-title.

4. TRW shall detail in the CMI Work Plan the design documents for the water treatment systems previously installed, or are in the process of being installed, on Municipal Wells No. 2 and No. 8. In addition, TRW shall develop an operation and maintenance program for all City of Sullivan municipal well treatment systems that TRW is responsible for under the DWCP. The operation and maintenance plan shall include protocols for treatment unit operation, training, parts replacement, systems upgrade notification procedures, down time limitations, and contingency plans and contacts, as applicable.

If in the future, the performance of the aeration system (currently installed on Municipal Well No. 8) is deemed inadequate by the department, TRW shall design and install an approved water treatment system similar to that installed on Municipal Well No. 2.

a - Denotes limit obtained from state (10 CSR 60 Chapter 4) and federal public drinking water regulations, November 1997.

b - Denotes limit obtained from Missouri Water Quality Standards (10 CSR 20-7.031) for protection of groundwater, March 1994.

C. Financial Assurance for corrective action shall be provided within 120 days of approval of the CMI Work Plan. TRW shall demonstrate compliance with the financial assurance requirements in effect at that time for corrective action performed under state law for any SWMU, AOC or release. Financial assurance is only required for that portion of the final remedy, which is estimated in the approved CMI Work Plan, that requires greater than 12 calendar months from the effective date of this Order to complete (i.e., long-term groundwater monitoring, site-security, treatment system operation and maintenance, contingency measures, etc.)

The financial assurance requirements for corrective action shall be consistent with and/or substantially equivalent to those specified in 40 CFR Part 264 Subpart H, as incorporated by reference in 10 CSR 25-7.264. The amount of financial assurance shall be based on TRW's cost estimate for the final remedy as contained in the approved CMI Work Plan.

Annually, by March 1, TRW shall adjust the corrective action cost estimate to account for inflation in accordance with 40 CFR 264.142(b) and any other changes in the costs associated with implementation, operation, maintenance and monitoring of the final remedy. If the cost estimate increases, documentation of adequate financial assurance for that increase shall be provided to the department within sixty (60) calendar days following the increase in the cost estimate

D. Within sixty (60) calendar days of completion of all construction activities associated with implementation of the final remedy, TRW shall submit a Construction Completion (CC) Report to the department and EPA. The CC Report shall contain, at a minimum:

1. A summary of all corrective measure construction activities implemented at the facility;

2. The specific "as-built" description of all municipal water supply and on-site groundwater treatment systems;

3. A chemical analysis of the on-site groundwater treatment system effluent that is to be discharged to the City of Sullivan's POTW. This analysis shall contain metals data, in addition to VOCs. Correspondence from the City of Sullivan and the department's Water Pollution Control Program approving these discharge contaminant concentrations should also accompany the sampling data;

4. Summaries of the confirmatory analyses of treated effluent from the groundwater treatment systems in-place at municipal water supply wells;

5. Exact design and locations of the required monitoring and recovery wells installed as part of the final remedy;

6. Copies of any deed restrictions placed on the chain of title;

7. A discussion of any deviations from the approved CMI Work Plan; and

8. The seal of an independent registered geologist and a professional engineer both registered in the state of Missouri.

E. A Facility Operation, Maintenance and Monitoring (OM&M) Plan shall be submitted by TRW within sixty (60) calendar days of completion of all construction activities associated with implementation of the final remedy. The OM&M Plan shall specify operation, maintenance and monitoring procedures for the final remedy including, at a minimum, the following information:

1. A description of the purpose of the OM&M plan and a summary description of long-term final remedy operation, maintenance, security and monitoring;

2. Presentation and discussion of the final remedy objectives including applicable media cleanup standards;

3. A description of the management approach to long-term final remedy implementation, including: 1) the personnel involved, their level/authority and their project-related responsibilities; 2) defining the lines of communication; and 3) qualifications of key personnel who will operate, maintain and monitor the final remedy;

4. Identification of equipment needed for long-term final remedy implementation, including that required for water supply treatment systems in-place at City of Sullivan-owned municipal wells;

5. A description of the training requirements and procedures for OM&M personnel, including any training provided to City of Sullivan employees for the operation and maintenance of water supply treatment systems in-place at City of Sullivan-owned municipal wells;

6. A description of any start-up procedures for elements of the final remedy, including any operational testing;

7. A description of normal operation and maintenance procedures related to the final remedy, including: 1) ongoing operational tasks; 2) ongoing maintenance tasks; 3) a description of applicable treatment or operational conditions; and 4) a schedule showing the frequency of each OM&M task;

8. An inspection and/or replacement schedule for final remedy equipment and components;

9. A discussion of surface water drainage in and around the areas addressed by the final remedy including how precipitation runoff will be managed;

10. A description of the GMP process for evaluating the effectiveness of the final remedy including determining when the corrective measures have achieved media cleanup goals criteria (e.g., GPS has been met); and

11. A description of the procedures to address any breakdown or operational problems with the final remedy including a list of redundant and emergency back-up equipment and procedures.

F. Reporting requirements placed upon TRW as part of the final remedy shall include the following:

1. Groundwater Corrective Action Reports providing a comprehensive evaluation of the facility-wide groundwater corrective action program shall be submitted on a quarterly basis for the preceding calendar three-month period. TRW's Quarterly Groundwater Corrective Action Reports shall be submitted to the department by June 1, September 1, December 1, and March 1 for each preceding calendar three (3) month period.

   TRW's Quarterly Groundwater Corrective Action Reports shall contain a corrective action program as well as conclusions concerning the overall narrative discussion of the nature and evolution of TRW's groundwater adequacy of the program as related to its intended purpose. Any conclusions concerning inadequacies in TRW's groundwater corrective action program shall be accompanied by a discussion of proposed remedies.

2. Monthly progress reports summarizing corrective action activities undertaken during each calendar month shall be submitted. Each monthly progress report shall be submitted within fourteen (14) calendar days of the last day of each reporting period.

   The first monthly progress report shall be due beginning with the first full month following the effective date of this Order. The monthly progress reports shall continue to be submitted until such time as TRW's CMI construction activities are complete and the Construction Completion Report has been submitted. Thereafter, the information presented in the monthly progress reports shall be discussed as part of the Quarterly Groundwater Reports.

G. A Corrective Measures Completion (CMC) Report and Certification of Completion of Corrective Measures shall be submitted by TRW within sixty (60) calendar days of completion of all corrective measures (i.e., all media protection/clean-up standards are met and all related corrective action activities are complete). The CMC Report shall contain a summary of corrective measures activities conducted at the facility, including any long-term operation, maintenance and monitoring program associated with the corrective measures.

To verify completion of corrective measures at the facility, TRW shall demonstrate in the CMC Report that groundwater contaminant levels have not exceeded the applicable GPS maximum concentration limits specified in Table I for a period of three consecutive years in all groundwater monitoring and attributed water supply wells. TRW's groundwater monitoring program and drinking water contingency plan shall continue until such time as TRW successfully makes this demonstration. TRW may request discontinuation of groundwater corrective action in specific areas of the facility prior to any facility-wide demonstration if it can be demonstrated that the three (3) year criterion has been met in those specific areas and there exists no potential for contaminant migration into these areas. TRW's groundwater corrective action program may cease upon written notification by the department that the three (3) year criterion has been met.

SUMMARY OF FACILITY RISKS

Groundwater in the vicinity of the former TRW facility is contaminated with VOCs (TCE, 1,2-DCE and 1,2-DCA), lead and chromium. The range of concentrations of these contaminants in groundwater that have been linked to releases at/from the facility are identified in Table 1. The measured levels in many monitoring wells exceed the proposed groundwater cleanup/protection standards referenced in Table 1. The proposed groundwater clean-up/ protection standards for the VOCs and chromium are set at the Maximum Contaminant Level (MCL) which are federal drinking water standards developed under the Safe Drinking Water Act. The federal drinking water standards are published in 40 CFR Part 141 Subpart B. The federal

MCLs for these chemical compounds are identical to those levels established under Missouri's Public Drinking Water regulations (10 CSR 60-4) for drinking water as well as Missouri's Water Quality Standards for protection of groundwater and drinking water supply (10 CSR 20-7). The proposed groundwater clean-up/protection standard for lead is set at the national primary drinking water action level of 15 ug/l as published in 40 CFR Part 141 Subpart I and under Missouri's Water Quality Standards for protection of groundwater and drinking water supply (10 CSR 20-7).

Groundwater throughout the region is used for private, municipal, and industrial water supplies. Available records show that many of the local water supply wells draw water from within the intermediate and deep zones of the contaminated aquifer. TCE is the most widespread contaminant released from the former TRW facility and has migrated in the groundwater towards and/or impacted nearby municipal drinking water supply wells. Contaminant migration and transport via groundwater from contamination released at the facility has been influenced by a combination of factors. These include natural surface and subsurface hydraulic conditions in the vicinity of the former TRW facility; pumping of nearby municipal wells; and the presence of significant secondary porosity features in the subsurface, some of which are karstic (voids and solution channels) and some structural (faults).

Based on all data collected during the corrective action process, contaminated groundwater is the primary exposure pathway for site-related contaminants and the focus of the remedy proposed in the Statement of Basis. Use of water from contaminated municipal and private water supply wells has the potential to affect the health of people using this water. The City of Sullivan's Municipal Wells No. 8 and No. 2 have both been removed from active service as water supply wells due to the presence of TCE in the water of these wells above the MCL of 5 ug/l. The selected remedy addresses treatment of contaminated groundwater at impacted municipal wells, which are determined to be TRW's responsibility, through the use of air stripping or equivalent technologies. In addition to the physical aspects of the remedy, institutional controls such as City of Sullivan Ordinances, in addition to the Missouri Well Construction Rules, will further restrict the design and inhibit installation of water supply wells within areas of the aquifer that are known to be contaminated.

Based on a human health risk assessment using EPA risk evaluation guidelines in the EPA guidance document titled "Risk Assessment Guidance for Superfund," the remaining concentrations of contaminants in soil, sediment and surface water related to releases at the facility do not pose an excess carcinogenic risk above 1 X 10-6. This value correlates to less than one person in one million at risk of developing cancer from exposure to contaminants related to releases from the facility to these environmental media. In addition, the noncarcinogenic hazard was calculated to be less than 1. A hazard index of less than 1 means that for potential soil-, sediment- and surface water-related exposures, adverse noncarcinogenic health effects due to chronic (long-term), subchronic (medium-term) and short-term exposures are not expected.

Based on sampling results from various springs monitored in the vicinity of the facility, no ecological risk impacts to these areas were identified. The qualitative ecological risk assessment contained in the RFI concluded that there is little potential for ecological impact in surface water (Winsel Creek and nearby springs) from known contaminant releases from the facility.

General Standards

· Overall Protection of Human Health and the Environment
· Attain Media Cleanup Standards
· Control the Sources of Releases
· Comply with Standards for Management of Wastes

Secondary Factors

· Long-Term Reliability and Effectiveness
· Reduction of Toxicity, Mobility or Volume of Wastes
· Short-Term Effectiveness
· Implementability
· Cost

The department and EPA have determined that the selected final remedy is protective of human health and the environment, controls the source(s) of releases, complies with applicable standards for waste management, and is expected to attain media-specific cleanup/protection standards at the facility over time. Ongoing evaluation of the findings of TRW's long-term corrective action groundwater monitoring program by the department and EPA will further ensure that the final remedy is protective. The GMP will identify any future migration of contamination in the groundwater and is the means to trigger further corrective action by TRW, as necessary, to respond to any increased risks to human health or the environment.

PUBLIC PARTICIPATION ACTIVITIES

The department and EPA solicited public comment on the proposed final remedy detailed in the Statement of Basis and associated corrective action administrative record starting April 12, 2000, and initially extended for 45 days until May 26, 2000. Public notices detailing this review opportunity were published in the Sullivan Independent News on April 12, April 19, April 26 and May 3. In addition, an availability session was held on May 11, 2000, to allow citizens to view information presented by the department, EPA, Missouri Department of Health (DOH) and TRW, and provide an opportunity for representatives from these organizations to respond to any questions at that time. During that availability session, numerous requests for a public hearing were submitted to the agencies in the form of individual comment forms and a petition signed by 57 persons.

The requests were granted by the agencies, and a public hearing was held on June 29, 2000. The deadline for the public comment period on the SB was subsequently extended from May 26, 2000 to July 7, 2000.

FUTURE ACTIONS

The department will assume the primary oversight role for future implementation of the ongoing corrective action activities at the TRW facility. EPA anticipates that the instrument under which the corrective action has thus far been carried out, EPA's 1993 Administrative Order on Consent (Docket No. VII-93-H-0008), will be terminated shortly after the State Order becomes effective.

DECLARATIONS

Based on the administrative record compiled for this corrective action, I have determined that the selected remedy to be ordered at this site is appropriate and will be protective of human health and the environment.

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William A. Spratlin, Director Date
Air, RCRA, and Toxics Division
U.S. EPA Region VII